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A profound decay had also affected the hard palæozoic limestones, from which the carbonate of lime had been dissolved, leaving a porous, rotten rock behind. This, as Dawson has shown, is well seen in the impure argillaceous Trenton limestone near Montreal, which, in localities protected by trappean dikes from the eroding action which came from the northeast, is found deeply decayed, while elsewhere, near by, its hard surface is worn down and glaciated. Examples of a similar local exemption of the decayed crystalline rocks from erosion are not wanting in New England.¹

The speaker alluded, in closing, to a process of mechanical disintegration, without chemical change, which in past ages had broken up undecayed crystalline rocks to form breccias and conglomerates. These are seen locally, from the ancient porphyry-conglomerates of the Lake Superior copper-mines to very recent deposits, and a remarkable example is met with in the beds of granitic material, which, in a recemented state, make up parts of the red sandstone of the Connecticut valley. The slow breaking up of many crystalline rocks by the action of frost had been suggested by Dawson as a potent agent in the production of such material, and the speaker conceived that this, in the present state of our knowledge, was the most probable explanation of its origin.—T. STERRY HUNT.

ANTHROPOLOGY.

ARTIFICIAL PERFORATION OF THE CRANIUM.—I wish to call attention to what seems to me to betoken a singular practice connected with the burial ceremonies of the aboriginal inhabitants of this country, and of which I can find nothing on record in the books, notwithstanding the remarkable nature of the custom, and the indubitable marks which would remain to testify in instances where it had been adhered to. I have reference to the artificial perforation of the top of the head after death.

The circular aperture, evidently made by boring with a rude, probably stone, implement, varies in size, in some instances having

¹ An example of this is seen in Kent in Connecticut, and also in North Adams, Massachusetts, where the tunnel lately made through the Hoosac Mountain shows that the gneiss rock at its western base is completely decomposed to a depth of 200 feet or more; while on the summit of the mountain are seen worn and glaciated surfaces of the same rock in an undecomposed state.

a diameter of one-third, in others one-half of an inch, and flaring at the surface. It is invariably placed in a central position at the top of the skull.

The first instance of its being brought to my knowledge was in the year 1869, when I took from the Great Mound on the River Rouge, Michigan, two fragments of crania, each of which exhibited this perforation. A skull recently presented to the museum of the Detroit Scientific Association by Mr. A. C. Davis, and which was exhumed from a mound on the Sable River, Lake Huron, Michigan, also has this mark. From ten to fifteen skulls were taken from the same mound, all being similarly perforated, and there being, as I am informed, no other remains interred with them. During last Summer (1874), in some further excavations made in the Great Mound at the River Rouge, among other relics exhumed were eight crania, two of which had this aperture. Of the remaining bones of the bodies pertaining to the two skulls in question, I specially noticed that many were wanting, and that those present were heaped *en masse*, and not in the usual manner of burial, seeming to imply that they were interred subsequently to being denuded of the flesh and the other soft parts of the body.

Besides the foregoing instances of this curious custom which have been brought to my immediate knowledge, I have since been informed of the finding of a skull at Saginaw, Michigan, which presented the peculiarity; but in this case there were three perforations arranged cocoon fashion.

All enquiry which I have made of learned societies or individuals in regard to this observance has elicited an utter disclaiming of all knowledge on the subject. The two largest collections in Ethnology in this country, the Smithsonian Institution and the Peabody Museum, contain no evidence of it. Prof. Joseph Henry, in replying to my queries, stated that the only information he had procured in relation to perforated skulls was the following from Prof. Mason of Columbian College: "It is an interesting coincidence that the head-hunting Dyaks of Borneo have a house in the centre of their village, in an upper story of which they keep the heads which they capture suspended by a string which passes through a perforation in the top of the skull." The late lamented Prof. Wyman, in a letter written me the day before his death, emphatically states that the fact of this perforation was new to him; adding: "There is nothing of the kind in any of the skulls in our

museum, nor have I seen it mentioned as existing elsewhere." A friend has learned for me that an educated Indian makes the statement, in reply to our enquiry, that he remembers hearing his father say that formerly the heads of distinguished men and chiefs were honored by this mark after death.

The skull from the Sable River is of a dark color, and its latitudinal or cephalic index, .770, would place it within the Orthocephalic or medium range; the altitudinal index being inferior, or exactly .745. The foramen magnum (contrary to the cranium of the North American Indian) has a central position, its index being .501. The two perfect specimens from the Rouge River are decidedly Brachycephalic, the cephalic indices being respectively .822 and .853, the altitudinal indices being inferior, or respectively .733 and .828, while the indices of the foramen magnum are, in one case .441, and in the other .507.

It is to be hoped that in thus calling attention to this singular custom, further information will be elicited; and I take this opportunity of earnestly soliciting the communication of any facts bearing on the subject, which I shall thankfully receive and duly acknowledge.

Since sending the foregoing to the *NATURALIST*, my attention has been called to a note in *Harpers' Magazine* for May, 1875, issued since my remarks were written, which states that "a communication made by Dr. Prunières (de Marvejols) before the meeting of the French Association for the Advancement of Science, at Lille, treated of the curious artificial perforations common among the neolithic skulls of the Lozère. These perforations vary, in the pieces exhibited, from an inch to an inch and a quarter in diameter. Near the perforated skulls were found rings of cranial bone, which seemed to be designed as amulets. These were evidently worked with flint tools. The men of the polished stone age practised trepanning; for if some of the skulls appear to have been perforated after death, others were treated during life, and the patients had lived for years afterward. One skull presented three perforations made near each other upon a line fore and aft. There is no distinction of age, the excisions occurring upon infants as well as upon adults. The motive of this strange custom was either medical or superstitious. They probably attributed disease to supernatural agencies. The evil spirit escaping through the opening made by the sorcerer, who wrapped the

operation in a shroud of mystery by preserving the detached piece as a precious relic. From the appearance of these facts reported by the learned archæologist of Lozère, he said that a new light had been shed upon the intellectual state of man in the polished stone age. It explained his religious conceptions, and confirmed the discovery of the figure of a goddess in the caverns of Baye (Marne). M. Broca remarked that perforated skulls were also found at the last named station. Among the skulls dug up by General Faidherbe were found two in the same condition. Dr. Chil, from the Canary Islands, said that perforated skulls had been found in the ancient burial-places of his country. Notice was also called to an example from the grotto of Lorde, upon which M. Hamy and M. Chaplain-Duparc gave some interesting details. A similarly perforated or trepanned skull was found by Mr. E. G. Squier among some ancient Peruvian crania collected by him."

The original report I have not seen ; but the concluding remark, on the Peruvian skull, removes some doubt as to the kind of perforation described. In the well-known instance discovered by Mr. Squier, the character and the meaning of the operation (trepanning, the excision having been made during the lifetime of the individual) are so evident, and the shape (rectangular) and the position (on the left side of the frontal bone) so different from that of the perforations which I have described in the crania from Michigan, that I never for a moment associated them, and therefore made no reference to the Peruvian skull. The same view, we may presume, was taken by the learned persons to whom I referred my discoveries, who could scarcely be supposed ignorant of the case in question.

I find no positive statement as to the position of the perforations mentioned at the meeting of the French Association ; but judge from certain remarks that (again unlike our instances from Michigan) there was no constant position observed. In certain cases of trepanning the position, of course, must have varied with the location of the injury to be operated on.

In short, the perforation which I find in the Michigan crania is exceptional—rarely present ; it is simply a circular hole about half an inch (more or less) in diameter, apparently rudely bored, invariably in the top of the head of adults, and made after death ; while those cases described in France, though only so recently

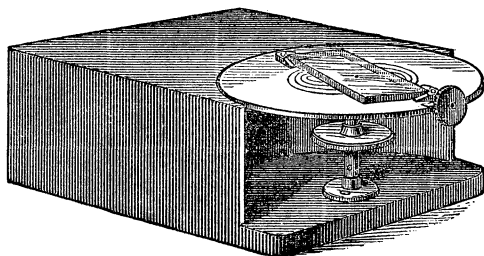
brought to notice, are quite numerous, and appear to be what may be more correctly termed trepanning, that is the part of the skull operated on was removed entire, and all ages are represented.

I have purposely refrained from much mention of my speculations on this custom of our aboriginal people; yet I have thought that the superstition of the modern North American Indian in regard to there being two souls, one of which visits the body after death, may throw some light on the subject. We know that the coverings of their graves, made of wood or bark, always have a perforation at one extremity for the supposed entrance and egress of the soul. But the question arises — Why, then, is not the perforation of the skull constant, or at least more frequent?—HENRY GILLMAN, *Detroit, Michigan*.

MICROSCOPY.

A NEW SELF-CENTRING TURN-TABLE.—Mr. C. F. Cox, of New York, has contrived a turn-table which centres the slide unerringly, and is at the same time a convenient working instrument. The slide is held, by pressure upon two diagonally opposite corners, between two clutches that are made, by a right and left screw, to move toward or from the centre simultaneously and at a uniform rate. The centre of revolution must therefore coincide with the centre

Fig. 210.



Cox's Self-centring Turn-table.

of the diagonal of the slide which is the exact centre of a truly rectangular slide, and is practically the centre of any slide fit to be used. This very useful piece of apparatus is, fortunately for the taste of its inventor and for the convenience of other microscopists, unencumbered by a patent; and it has been already constructed by Miller Bros. and by J. W. Queen & Co. The style made by the latter firm is figured in the accompanying cut.